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FINAL REPORT
ANTENNA
RADIATION PATTERN MEASUREMENTS
ON THE B-47 AIRCRAFT

SRI PROJECT No. 606
Contract No. AF 33 (616)-83, E. O. No. 112-33 SR-6F2
Task V

Prepared for
Wright Air Development Center:
Wright-Patterson Air Force Base
Ohio
April, 1953

RESTRICTED SECURITY INFORMATION

STANFORD RESEARCH INSTITUTE

STANFORD, CALIFORNIA

1 April 1953

Final Report, SRI Project No. 606
Air Force Contract No. AF 33(616)-83
Task V

**ANTENNA RADIATION PATTERN MEASUREMENTS
ON THE B-47 AIRCRAFT**

By
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Approved:

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Department of Engineering Research

T. H. Morrin
T. H. Morrin,
Director of Engineering Research

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ANTENNA RADIATION PATTERN MEASUREMENTS ON THE B-47 AIRCRAFT

1 April 1953

The purpose of this study is to obtain radiation patterns of antennas for the following equipments

1. Omnidrome-Localizer (AN/ARN-14 Equipment) - Collins 37J1 antenna on the top centerline of the fuselage at F.S. 390 (File Nos. B-47-VOR-115).
2. Homing (AN/APN-12 Equipment) - Five element array of stubs on the underside of the left wing (File Nos. B-47-APN12-200).
3. VHF-UHF Command Communication (VRC-3, ARC-19 Equipment) - Stub antenna on top of the vertical stabilizer. (File Nos. B-47-ST-125 to B-47-ST-375, inclusive).

A 1/20th scale model B-47 together with the antennas installed at specified locations (Fig. 1) was furnished by the Communication and Navigation Laboratory of Wright-Patterson Air Force Base.

Patterns were not recorded on the DME antenna. A procedure developed at this laboratory for the measurement of higher frequency aircraft antennas, such as the DME, employs larger scale models (i.e., 1/5th scale) and permits accurate pattern recording with a minimum of difficulty. The method used to plot patterns and determine the equivalent isotropic radius on these larger scale models is described in a forthcoming report.* For this reason Stanford Research Institute does not have facilities to record patterns at 24 kMc model frequency, as required for the B-47 model furnished.

* A. H. Ellis, "Reference Antenna for Use with Model Pattern Ranges," Technical Report No. 39, SRI Project 591, Contract No. AF 19(600) 266.

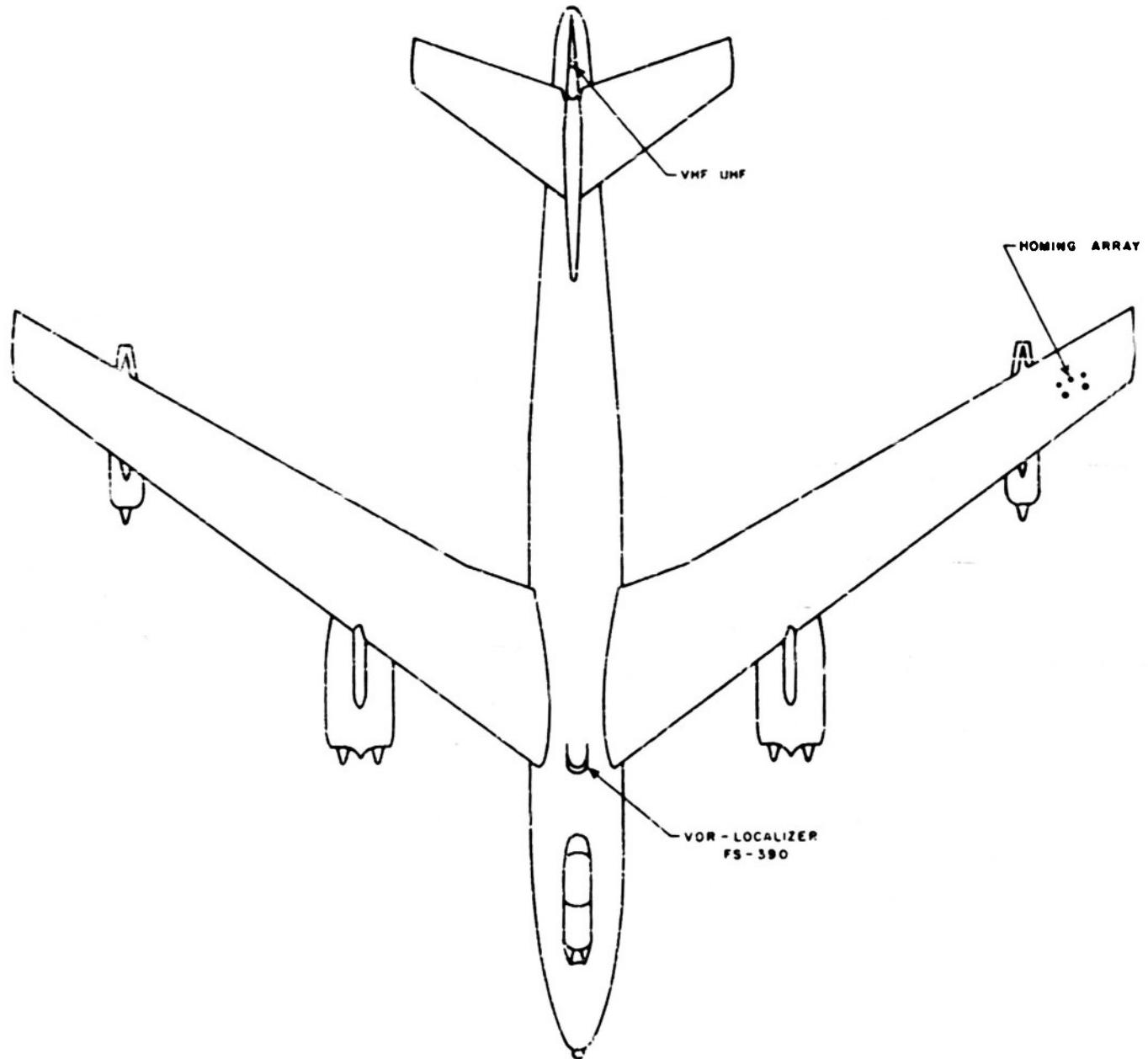


FIG. I
B-47 ANTENNA LOCATIONS

File No. B-47-VOR-115

Project 606E

Date 3/20/53

Aircraft Designation B-47

Antenna Type Collins 37J1 Ramshorn'

Antenna Location Top Centerline F S. 390

Remarks

Full Scale Frequency 115 Mc

Scale Factor 20

Model Frequency 2300 Mc

Curves Plotted In Field

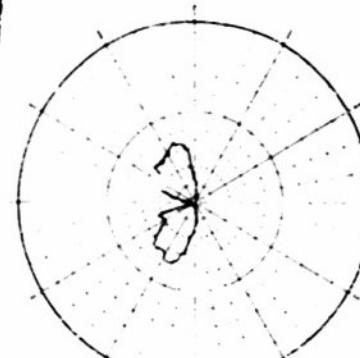
Data Taken By E. Wright

FILE NOS. E47-VOR-115

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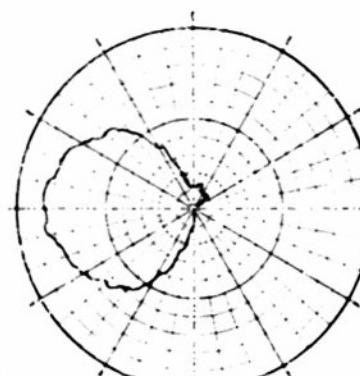
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ϕ = 90°.



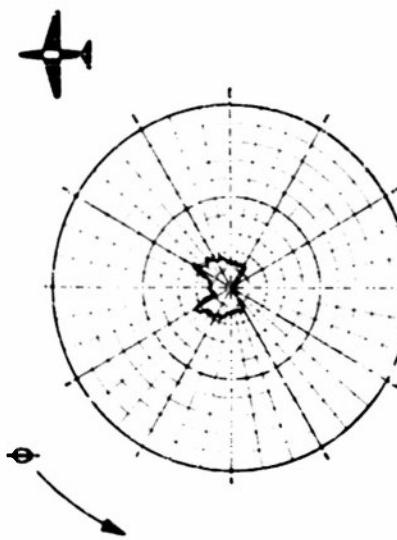
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ϕ = 180°.



(24)

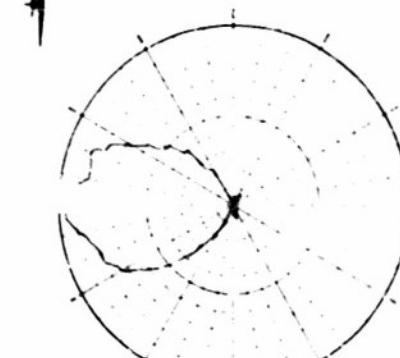
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E_θ POLARIZATION

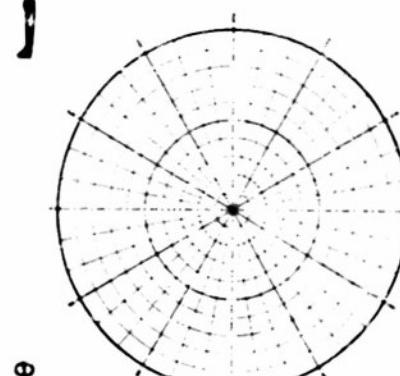
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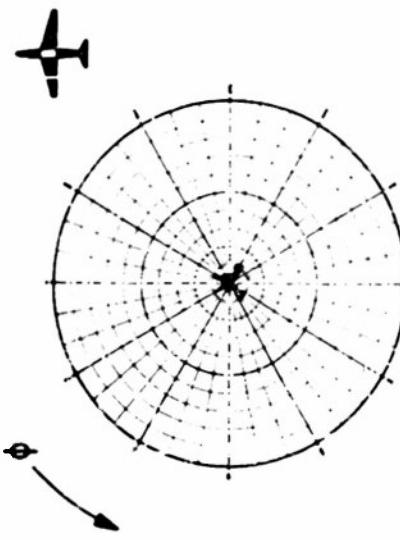
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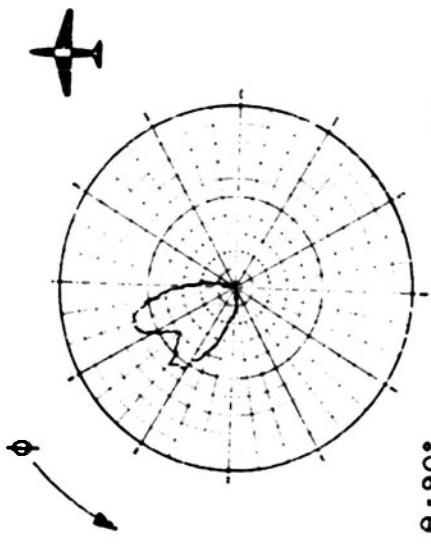


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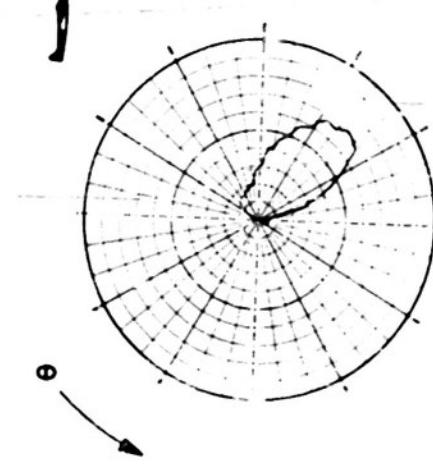
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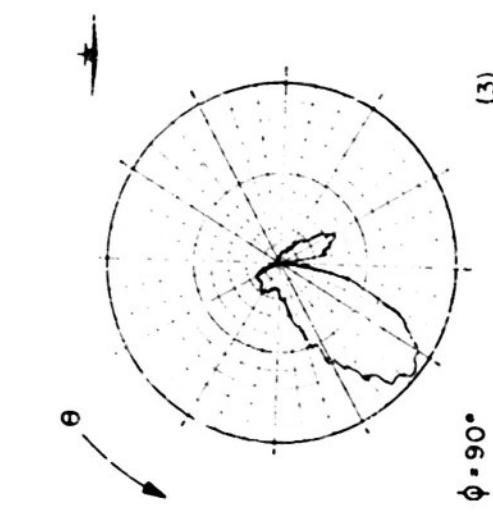
File No B-47-APN12-200
Project 606E
Date 3/24/53
Aircraft Designation B-47
Antenna Type Five Element Array
Antenna Location Underside of Left Wing
Remarks:
Full Scale Frequency 200 Mc
Scale Factor 20
Model Frequency 4000 Mc
Curves Plotted In Field
Data Taken By E. Wright



(1) $\theta = 90^\circ$

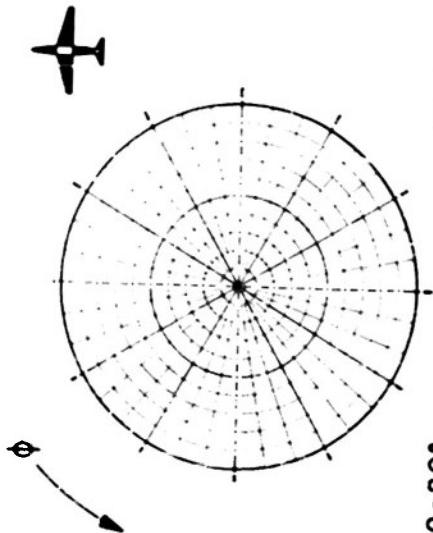


(2) $\phi = 180^\circ$

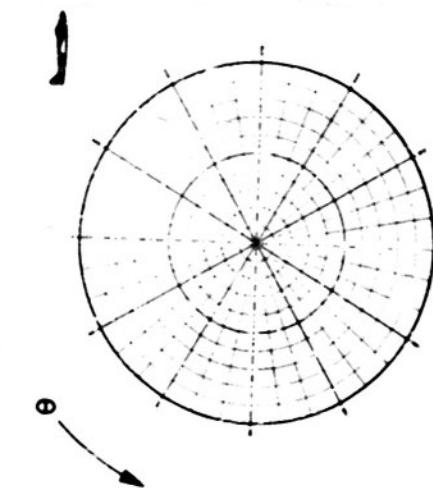


(3) $\phi = 90^\circ$

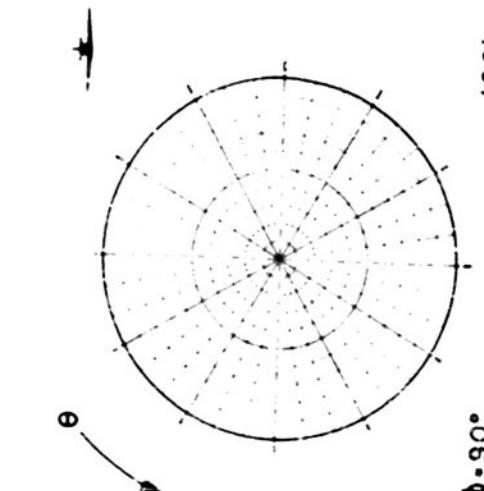
E_θ POLARIZATION



(24) $\theta = 90^\circ$



(25) $\phi = 180^\circ$

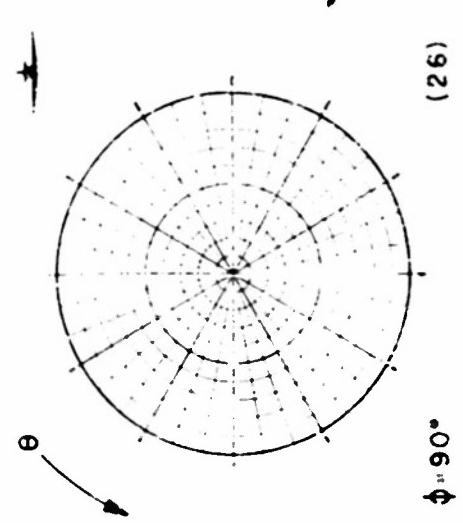
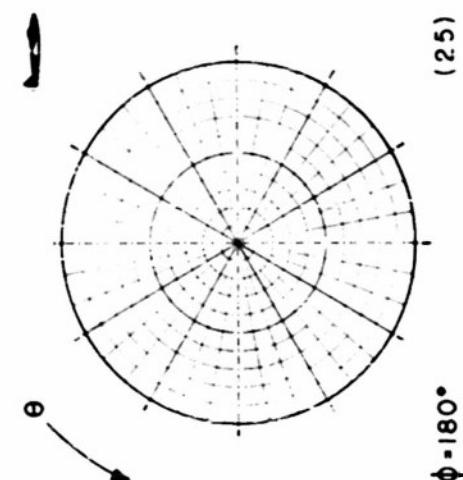
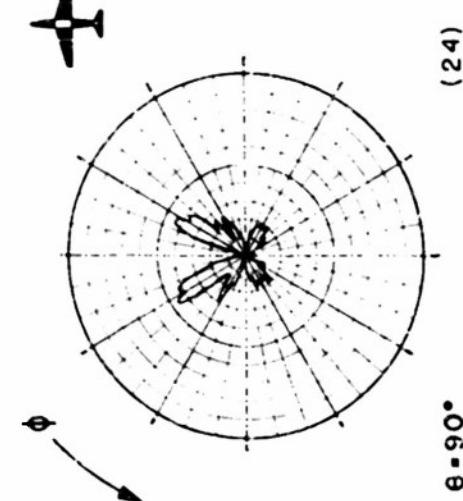
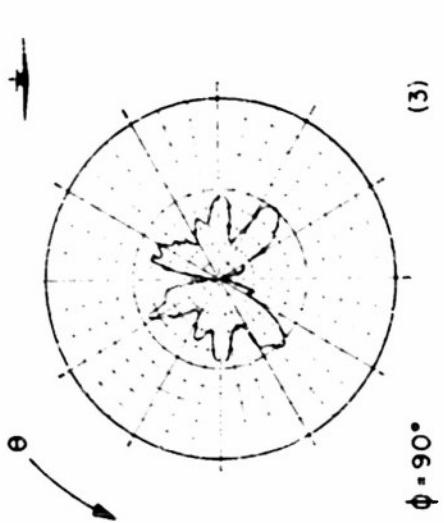
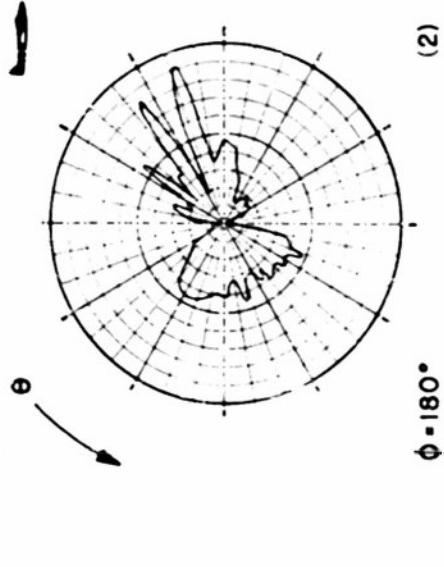
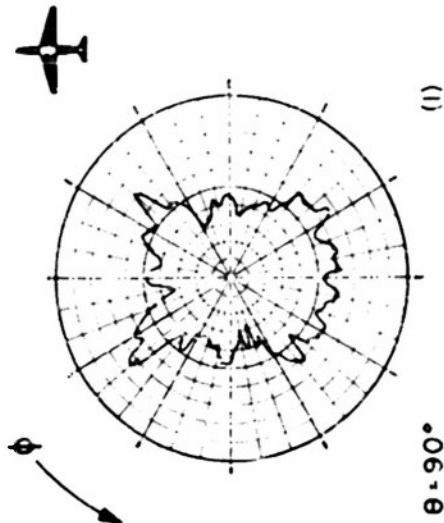


(26) $\phi = 90^\circ$

E_ϕ POLARIZATION

FILE NOS. B47-APN12-200

File No: B-47-ST-125
Project: 606E
Date: 3/19/53
Aircraft Designation: B-47
Antenna Type: Stub
Antenna Location: Top of Vertical Stabilizer
Remarks:
Full Scale Frequency: 125 Mc
Scale Factor: 20
Model Frequency: 2500 Mc
Curves Plotted In: Field
Data Taken By: E Wright



FILE NOS. B47-ST-125

File No: B-47-ST-150
Project: 606E
Date: 3/20/53
Aircraft Designation: B-47
Antenna Type: Stub
Antenna Location Top of Vertical Stabilizer
Remarks:
Full Scale Frequency 150 Mc
Scale Factor: 20
Model Frequency 3000 Mc
Curves Plotted In: Field
Data Taken By: E-Wright

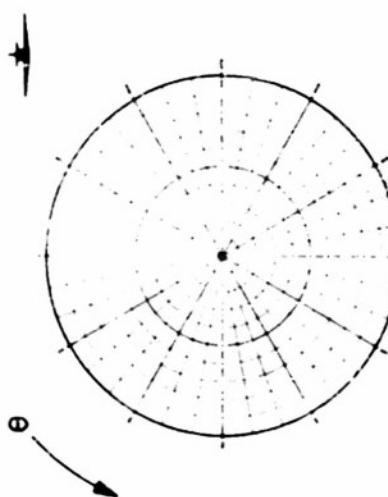
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FILE NOS. 847 - ST - 150

E_θ POLARIZATION

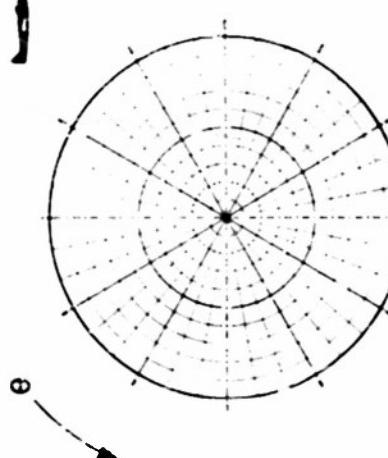
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$\phi = 90^\circ$



(25)

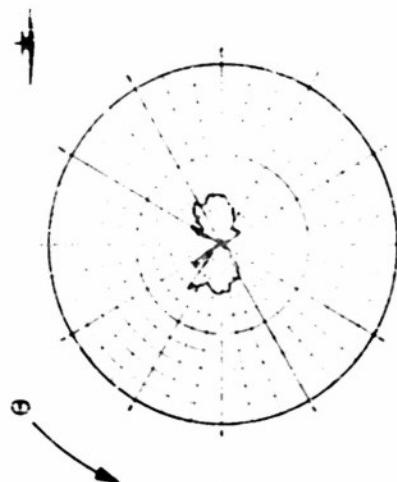
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E_φ POLARIZATION

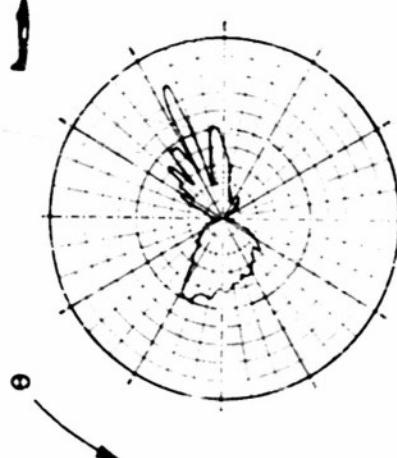
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$\phi = 90^\circ$



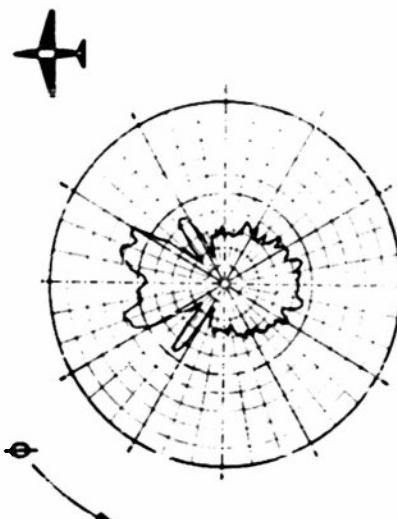
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$\phi = 180^\circ$



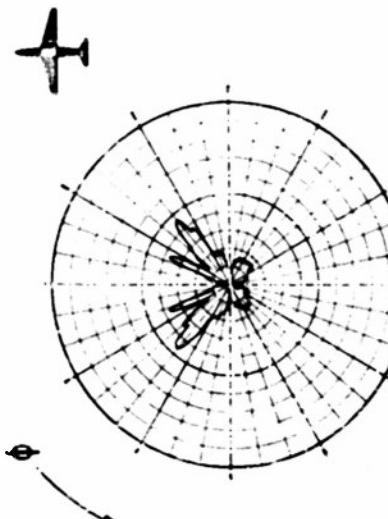
(1)

$\phi = 90^\circ$



(24)

$\phi = 90^\circ$



File No. B-47-ST-250

Project 600E

Date 3/16/53

Aircraft Designation B-47

Antenna Type Stub

Antenna Location Top of Vertical Stabilizer

Remarks

Full Scale Frequency 250 Mc

Scale Factor 20

Model Frequency 5000 Mc

Curves Plotted In Field

Data Taken By E. Wright

100

FILE NOS. B47-ST-250

$E\phi$ POLARIZATION

(26)

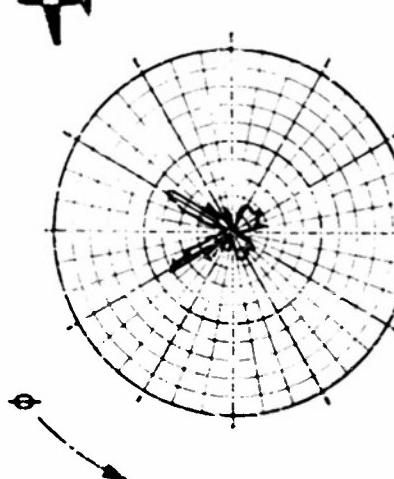
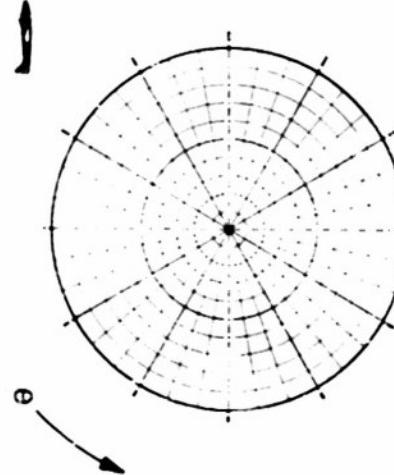
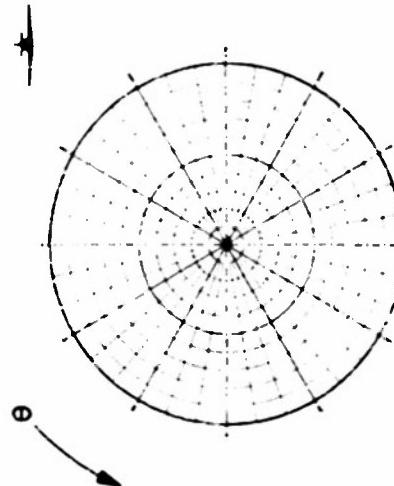
$\phi = 90^\circ$

(25)

$\phi = 180^\circ$

(24)

$\theta = 90^\circ$



E_θ POLARIZATION

(3)

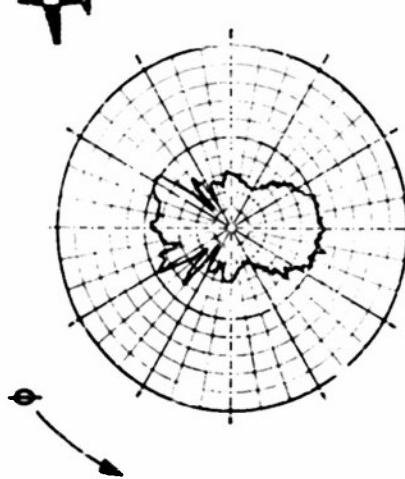
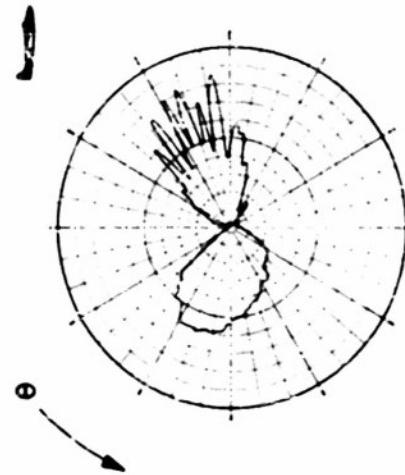
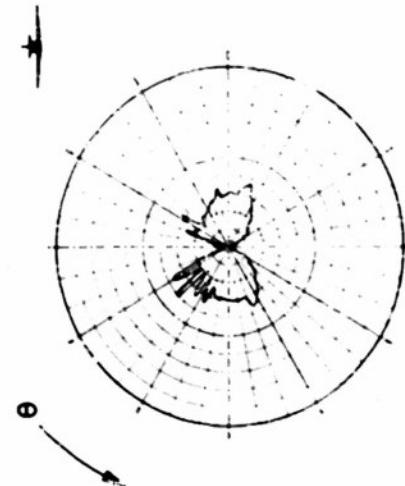
$\phi = 90^\circ$

(2)

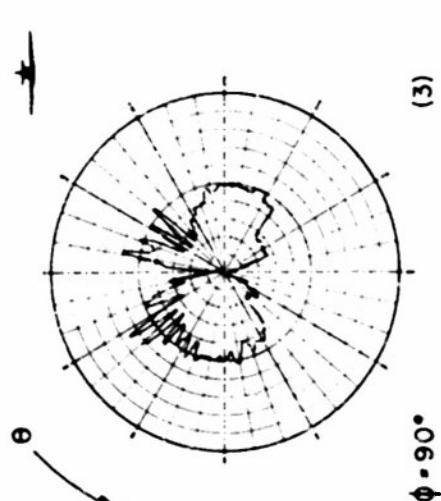
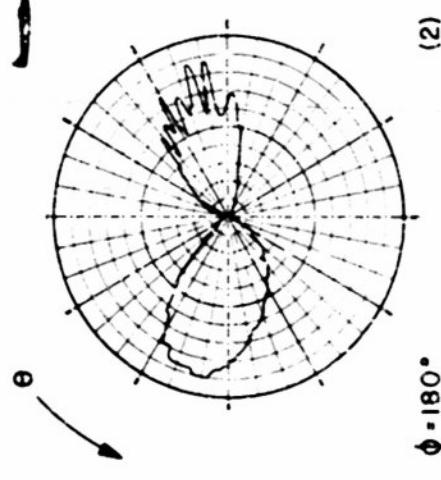
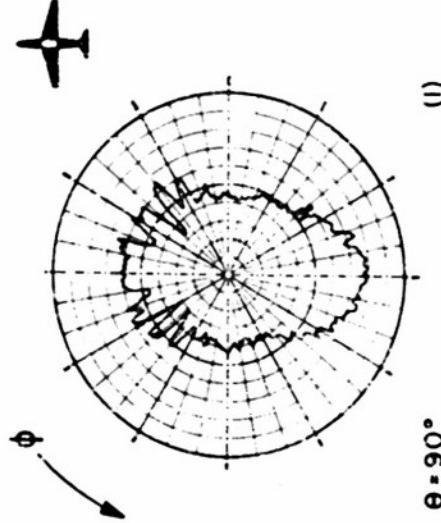
$\phi = 180^\circ$

(1)

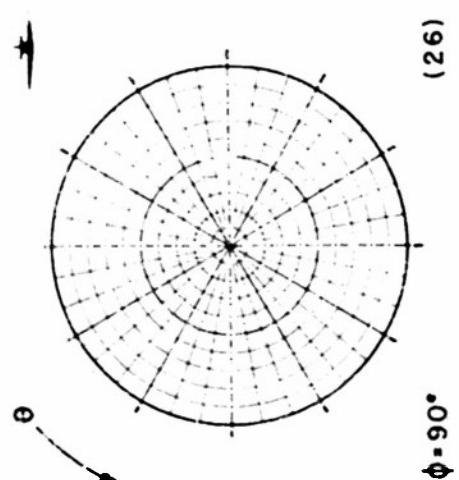
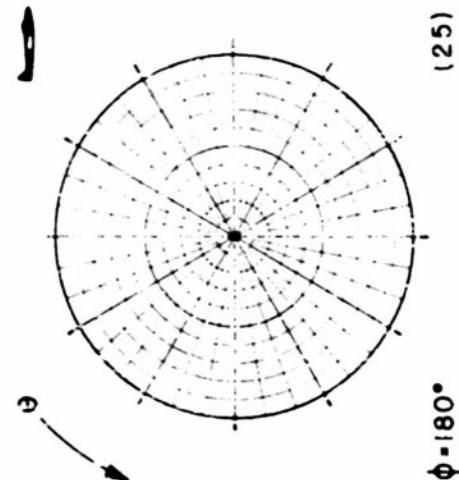
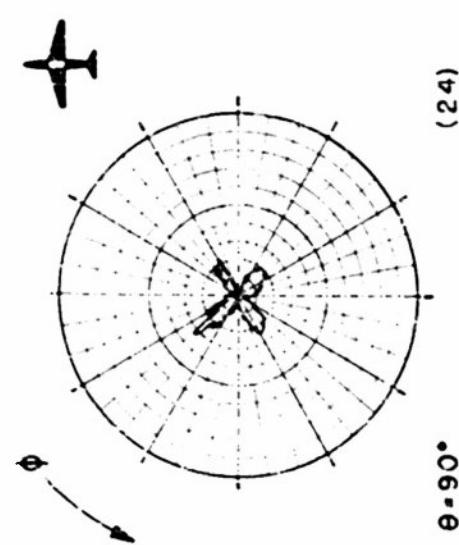
$\theta = 90^\circ$



File No. B-47-ST-350
Project: 606E
Date. 3/23/53
Aircraft Designation. B-47
Antenna Type: Stub
Antenna Location: Top of Vertical Stabilizer
Remarks:
Full Scale Frequency: 350 Mc
Scale Factor: 20
Model Frequency: 7000 Mc
Curves Plotted In: Field
Data Taken By: E. Wright



E θ POLARIZATION



E ϕ POLARIZATION
FILE NOS. B47-ST-350

604-10

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File No. B-47-ST-375

Project 606E

Date 3 18 53

Aircraft Designation B-47

Antenna Type Stub

Antenna Location Top of Vertical Stabilizer

Remarks

Full Scale Frequency 375 Mc

Scale Factor 20

Model Frequency 7500 Mc

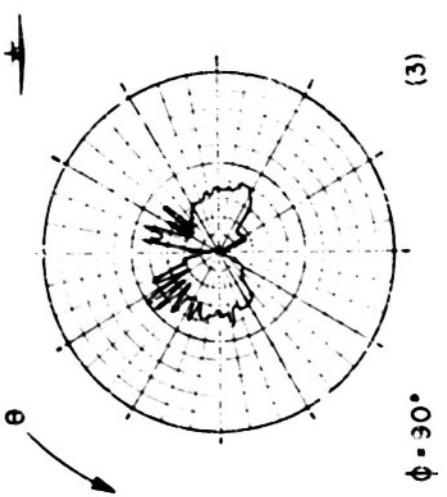
Curves Plotted In Field

Data Taken By E. Wright

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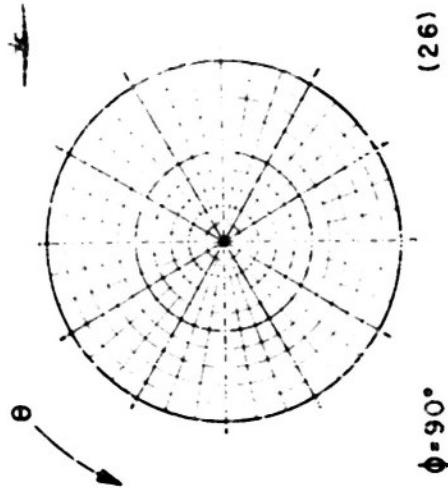
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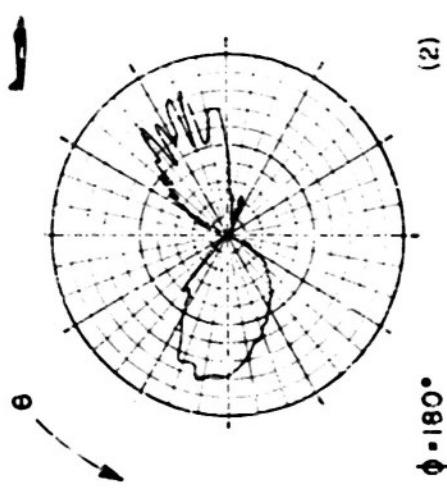
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$\theta = 90^\circ$



(26)

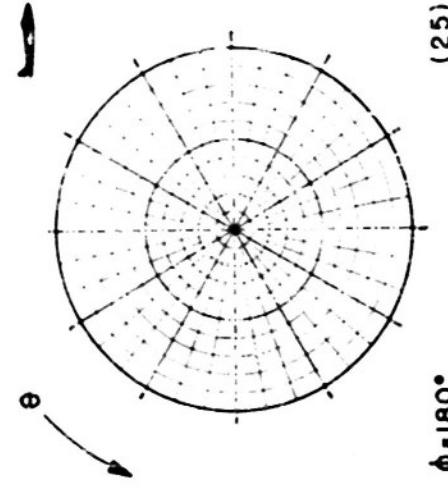
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(2)

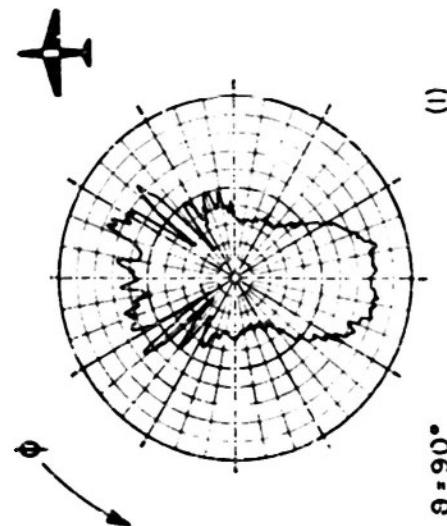
E θ POLARIZATION

$\phi = 180^\circ$



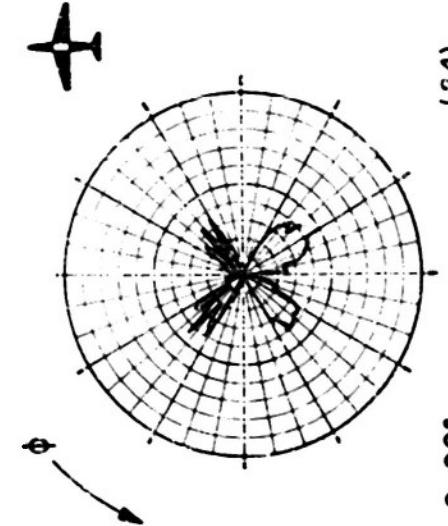
(25)

$\phi = 180^\circ$



(1)

$\theta = 90^\circ$



(24)

$\theta = 90^\circ$

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FILE NOS. 847-ST-375